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ABSTRACT

"Saturday Subway Ride," a program designed to teach pupils creative thinking techniques and positive attitudes toward creative ideas, is a 92-page workbook in a story-exercise format. Secondary objectives for the product include improving verbal fluency and creative writing. Three classrooms 61 sixth graders and 34 fifth graders at two Wisconsin schools, used the program for two months. The purpose of this paper is to report the results of this initial field study. The major findings included information on the usability of the product and student attainment of product objectives. Teacher annotations, on-site visitations and rated pupil workbooks indicated that considerable reworking of the exercises was needed, although the teachers gave satisfactory ratings to the program overall. Ratings of the exercises showed that only some pupils learned adequately the five techniques of creative thinking: Part-Changing, Checkerboard, Checklist, Find-Something-Similar, and Brainstorming Methods. Changes from pre-test to post-test on the 22-item attitude survey and the verbal fluency tests were both significant and positive. Finally, ratings of short writing samples showed improvement for girls but not for boys from pre-test to post-test. (Author)

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SATURDAY SUBWAY RIDE: A REPORT ON THE INITIAL TRYOUT

WISCONSIN RESEARCH AND DEVELOPMENT

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Technical Report No. 210

SATURDAY SUBWAY RIDE: A REPORT ON THE INITIAL TRYOUT

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Report from the
Quality Verification Component of Program 5
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Appendices D-H

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Statement of Focus

The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from the Quality Verification Program, whose principal function is to identify and invent research and development strategies taking into account current knowledge in the field of statistics, psychometrics and computer technology. The Quality Verification Program collaborates in applying such strategies in research and development. The translation of theory into practice and presentations of exemplars of methodology are challenges which the Quality Verification Program strives to meet.

Contents

		Page
	Abstract	vii
	List of Tables and Figures	ix
I	Introduction	1
	Objectives for the Product	2
	Preliminary Appraisals	2
	Pilot Study	3
II	Product Usability	5
	Instrumentation	5
	Findings	5
III	Attainment of Product Objectives	9
	Instrumentation	9
	Data Collection and Analysis	10
	Results	10
IV	Conclusions and Discussion	19
	References	21
	Appendices	
	A Behavioral Objectives for the Workbook Exercises	23
	B Ratings of Exercises by Grade and Sex	25
	C Field Test Manager's Report	27
	D Teacher Questionnaire - Saturday Subway Ride	31
	E Attitude Questionnaire	33
	F Fluency Tests: Associational, Ideational, Word	39
	G Writing Sample: WHAT'S IT ALL ABOUT?	53
	H Activity 5: UNUSUAL USES	59

List of Tables and Figures

Table		Page
1	Summary of the Ratings of 18 Workbook Exercises	6
2	Analysis of Covariance of Attitude Toward Creative Imagination	12
3	Adjusted Mean Attitude Changes by School/Grade and Sex	12
4	Multivariate Analysis of Covariance of Verbal Fluency Change	13
5	Summary of Means and Gain Scores for Verbal Fluency Tests	13
6	Verbal Fluency Adjusted Mean Gain Scores by Sex and School	14
7	Analysis of Covariance of Writing Performance	15
8	Writing Ability Adjusted Mean Change in Ratings by School/Grade and Sex	15
9	Multivariate Analysis of Rater Differences among Three Raters	15
10	Multivariate Analysis of Covariance of Creative Imagination	16
11	Summary of Changes in Creative Imagination and Related Data	16
12	Creative Imagination Adjusted Mean Gain Scores by Variables School/Grade and Sex	17

Figure		
1	Relative frequency of successful performance by school and sex.	11

Abstract

Saturday Subway Ride, a program designed to teach pupils creative thinking techniques and positive attitudes toward creative ideas, is a 92-page workbook in a story-exercise format. Secondary objectives for the product include improving verbal fluency and creative writing. Three classrooms, 61 sixth graders and 34 fifth graders at two Wisconsin schools, used the program for two months. The purpose of this paper is to report the results of this initial field study.

The major findings included information on the usability of the product and student attainment of product objectives. Teacher annotations, on-site visitations and rated pupil workbooks indicated that considerable reworking of the exercises was needed, although the teachers gave satisfactory ratings to the program overall. Ratings of the exercises showed that only some pupils learned adequately the five techniques of creative thinking: Part-Changing, Checkerboard, Checklist, Find-Something-Similar, and Brainstorming Methods. Changes from pre-test to post-test on the 22-item attitude survey and the verbal fluency tests were both significant and positive. Finally, ratings of short writing samples showed improvement for girls but not for boys from pre-test to post-test.

I
Introduction

The stimulation of creative thinking is a widely accepted goal of education but one that is not ordinarily thought of in terms of observable attainments of pupils exposed to creativity programs. Creativity may be conceived as a composite of attitudes which foster a predisposition toward new ideas, cognitive abilities which contribute to the production of new ideas, and particular techniques which facilitate the generation of new ideas. Myers and Torrance (1964, 1965a, 1965b, 1966a, 1966b, 1968) have developed strategies for improving one's ability through practice. Another valid educational approach to improving creative problem-solving skills is to focus on attitudes and techniques (Davis, 1969). Two workbooks providing such an instructional program for 10- to 14-year-olds have been developed at the Wisconsin Research and Development Center for Cognitive Learning under the direction of Gary A. Davis. The first workbook, Thinking Creatively (Davis & Houtman, 1968), was tested and served as a prototype for the second workbook (Davis, Houtman, Warren, & Roweton, 1969). The initial field test of the second workbook, Saturday Subway Ride, is the topic of this report.

Attitudes may be defined as learned, emotionally-toned predispositions to react consistently, favorably or unfavorably, toward persons, objects or ideas (Klausmeier & Ripple, 1971). Applied specifically to creative thinking the above definition supports the following four statements:

1. Creative development is fostered by a favorable predisposition toward "wild" or imaginative ideas.

2. "Constructive discontent" (Parnes, 1966), the notion that virtually any object, practice, or idea can be improved, is an attitudinal-set characteristic of the creative person.

3. Appreciation for the critical role of innovation in society's progress, both historically and currently, fosters creativity.

4. It is possible to learn to be a more productive and more original thinker.

In prior research (Davis, Houtman, Warren, & Roweton, 1969) students demonstrated changes in their attitudes toward creative thinking by responding more positively to verbal descriptions keyed to the above statements.

Techniques for systematically producing new ideas have been adapted, from those devised for use in industrial training programs (Davis, Manske, & Train, 1967; Edwards, 1968; Olton & Crutchfield, 1969; Parnes, 1962), by Davis and Houtman (1968) for intermediate and junior high level pupils. The techniques are described as follows:

1. The PART-CHANGING method, an adaptation of Crawford's (1954) attribute listing procedure. The student learns to identify important attributes or parts of an object, considering each attribute as a source of potential improvement. For example, with an object such as a piece of chalk, students learn to identify the attributes of size, shape, and color. By considering changes for each of these individual attributes, ideas for many different kinds of chalk may be quickly produced.

2. The CHECKERBOARD method, a simplification of the morphological synthesis technique (Allen, 1962). Students first list specific ideas for changing one part of an object along one axis of a two-dimensional diagram, and specific ideas for another part along the other

axis; novel idea combinations are found in the intersecting squares of the CHECKERBOARD. For example, if students are asked to "invent new kinds of games which have never before been considered," they might list types of equipment which could be used along one axis, list things the players could do along the other axis, and then examine the many idea combinations occurring in the cells of the matrix.

3. The CHECKLIST procedure. Students consider each item on a prepared list as a possible source of innovation with respect to a given problem. For example, students can use a history book as a "checklist" of ideas for possible play themes.

4. The FIND-SOMETHING-SIMILAR method, a metaphorical activity. Students are asked to consider how other people, animals, and plants solve a similar problem. For example, students can find solutions for a school parking problem by thinking of ways that animals store things.

5. The BRAINSTORMING group-think method (Osborn, 1963). Groups of 3-8 students use brainstorming techniques to find solutions for problems such as "how to make more money" or "how to turn a classroom into a foreign planet." The BRAINSTORMING method has four basic ground rules:

   a. Criticism is ruled out. Adverse judgment of ideas must be withheld until later.

   b. "Free-wheeling" is welcomed. The wilder the idea, the better; it is easier to tame down than to think up.

   c. Quantity is wanted. The greater the number of ideas, the more the likelihood of useful ideas.

   d. Combination and improvement are sought. In addition to contributing ideas of their own, participants should suggest how ideas of others can be turned into different ideas; or how two or more ideas can be joined into still another idea (Osborn, 1963).

In Saturday Subway Ride the creative thinking techniques and attitudes are presented in a story-exercise format. The story theme is an around-the-world subway ride with fantastic episodes, some supplied by the pupil, at each stop. In addition to presenting exposure to, and practice with, the techniques, opportunities for creative writing abound in the 92-page workbook. The explicit objectives for each segment of the program are presented in Appendix A. The workbook was specifically designed to be used over a two- to four-month period with intermediate-level pupils.

Art work and a teacher's guide were projected but not complete at the time the workbook was subject to its first field trial.

Objectives for the Product

The primary objectives for the product reflect the developer's deliberate choice of improving creative skills through focusing upon teaching techniques and attitudes. The two primary objectives are stated as follows:

1. Pupils will demonstrate their understanding of the five techniques of creative problem-solving presented in the text through completion of pertinent workbook exercises.

2. The attitude of pupils toward creative ideas and endeavors will improve.

Because practice in verbal expression and in creative writing was provided extensively in the workbook, two secondary objectives were stated for these skills:

3. The verbal fluency of pupils will increase.

4. The writing of pupils will be more imaginative.

Preliminary Appraisals

Before the workbook was piloted in a classroom situation, professional judgment regarding the quality of the workbook was sought, and a readability analysis was done. Two teachers at the intermediate level and an elementary school principal read and evaluated the materials. The readers rated the ideas presented, degree of fantasy, and style of writing between

appealing and very appealing (the 3rd and 4th points on a five-point scale). They felt that the role of creativity training in the classroom was an important one and rated the exercises as very valuable. In responding to open-ended questions, the readers expressed a desire to use the workbook in their own classrooms and felt that the content of the workbook would be appropriate for children in the intermediate through early junior high levels. They suggested that the proposed teacher's guide offer a variety of activities to allow the teacher to provide flexible grouping and extension of the workbook activities for motivated students. They found no objectionable aspects in the content of the workbook and felt that parents would likewise find none.

The Dale-Chall Formula (Dale & Chall, 1948) was used to determine the reading level of the workbook. Samples of the text had raw scores ranging from 4.2 to 6.2. After conversion, a mean grade level of 5.2 was obtained, indicating that the prose was appropriate for use with older intermediate-level students without reading deficits and with younger intermediate-level students who are reading above grade level.

Pilot Study

The first field trial of a product is concerned mainly with its usability. Of particular interest is the detection of problems in implementation which can be corrected by revision of the materials. A secondary purpose of the evaluation is to determine whether the objectives set for the product are attained by the pupils using the materials.

Three classrooms of pupils participated in the pilot test during the first semester of the 1970-71 school year. A class-sized group (N=34) in their sixth year (Grade 5) of school in Unit D of Harrison School in Janesville, Wisconsin, and two classrooms of sixth graders (N=61) from Randall School in Madison, Wisconsin used the materials. The schools serve neighborhoods of middle to upper-middle socioeconomic status. Median pupil performance on standardized tests is generally above grade level in these schools.

Prior to implementation, the three cooperating teachers were briefed individually regarding the instructional programs and associated evaluation procedures. The workbook was used during a period of approximately eight weeks. Teachers were asked to annotate a copy of the student workbook, and Center staff monitored the instructional session periodically. Responses in pupil workbooks were analyzed, and the opinions of pupils and teachers sought, to determine what improvements were required in the material. Of special interest was performance on those exercises in the workbook in which the pupil applied the five creative problem-solving techniques. Additionally, pupils were pre- and post-tested to ascertain whether the product objectives for improvement in attitude, verbal fluency, and creative writing were attained.

Subsequent chapters of this report deal with formative aspects of the evaluation and with the results related to attainment of product objectives.

II
Product Usability

The formative evaluation of Saturday Subway Ride assessed the usability of the product as revealed both in day-to-day events associated with program implementation and in the judgments of pupils, teachers, and field test staff about the procedures and program in general. In other words, attention was paid both to the specific activities carried out in the pilot classrooms and to the participants' perceptions of the total program.

Instrumentation

Usability of the specific pupil activities was studied by three means: rating of workbook exercises, annotations of teachers, and observations of the field test staff both on site and through workbook analyses. Fifty-eight workbooks, 30 from the fifth grade group (12 boys, 18 girls) and a sample of 28 from the sixth grade group (19 boys, 9 girls) were rated as follows:

0= The student did not attempt the exercise.

1= The student attempted at least part of the exercise, but the results were either of poor quality or not according to directions.

2= The exercise was done according to instructions, but was of low quality.

3= The exercise was done according to instructions, and was of fair or good quality.

4= The exercise was done according to instructions, and was outstanding, excellent.

The usability of the product in general was assessed through a questionnaire to which all participating teachers responded; through informal conversations between the field test staff and pupils, teachers and the principal; and through the frankly subjective judgment of the field test staff.

Findings

A summary of the ratings for the exercises in the 58 workbooks evaluated may be found in Table 1. Further information regarding the number of responses falling into each rating category by grade and sex may be found in Appendix B. The ratings were categorized for each exercise by 1) the percent of total responses having a "0" rating (exercises were not attempted), 2) the percent of total responses having ratings of 1 or 2 (exercises incorrectly done or of poor or low quality), and 3) the percent of total responses having ratings of 3 or 4 (exercises were acceptable and of good or outstanding quality).

The percent of students receiving a 3 or 4 rating show that less than one-half of the students were able to complete acceptably nine exercises, or half of the workbook's total number of exercises. In four of those exercises, fewer than one-third of the students could complete them acceptably. At least one-fifth of the students did not attempt five of the exercises, and in only one case (Exercise No. 1) did all students attempt the exercise. Specific comments about each of the exercises is provided by the field test staff who rated the exercises and observed their use in the pilot classroom (Appendix C). The information provided leads to the following conclusions:

1. The material does not provide enough

Table 1
Summary of the Ratings of 18 Workbook Exercises

Exercise No. and Title	Ratings by Percent		
	0	1 & 2	3 & 4
1 Songs & Song Writing	0	43.1	56.9
2 Illustration	1.7	37.9	60.3 off by -0.1
3 Dialogue	3.4	22.4	74.1 off by -0.1
4 Dialogue—A Scene for Study & Discussion	20.7	62.1	17.2
5 Creating a New Language	17.2	48.3	34.5
6 Brainstorming	32.8	12.1	55.2 off by +0.1
7 Part-Changing (1 & 2)	1.7	1.7	96.6
(3 & 4)	5.2	44.8	50.0
8 Advertising Campaign	6.9	31.0	62.1
9 Checklist (1)	8.6	62.1	29.3
(2)	20.7	34.5	44.8
(3)	8.6	74.1	17.2 off by -0.1
10 Tall Tales	5.2	43.1	51.7
11 Discussion of Differences	12.1	50.0	37.9
12 Find-Something-Similar (1 & 2)	3.4	58.6	37.9 off by -0.1
(3)	6.9	91.4	1.7
13 Describing People	25.9	31.0	43.1
14 Discussion	22.4	36.2	41.4
15 Plot and Action	10.3	46.6	43.1
16 Role Playing	3.4	72.4	24.1 off by -0.1
17 Checkerboard (1)	5.2	29.3	65.5
(2)	1.7	32.8	65.5
18 Story Ending	1.7	32.8	65.5

information for students to complete an appreciable number of exercises.

2. The tasks in some exercises are not clearly conceptualized or presented.

3. There were clear-cut differences in responses of girls and boys to certain exercises; in most instances girls responded more favorably.

4. The assumption of adequate writing skills to perform the exercises may be invalid.

In summary, considerable reworking of the exercises is required to make the product satisfy usability requirements for students.

A review of the teacher questionnaire data, presented in Appendix D, indicates that the teachers who implemented the program expressed a mildly favorable opinion toward it. They indicated that their students enjoyed the workbook although there was some boredom toward the end of the booklet. Nor did those students who have difficulty with written expression respond well. It was observed that girls enjoyed the exercises more than boys and it was recommended that some activities focus on sports. Two other recommendations suggested that some of the materials may have been improperly designed for students in the target group: "sixth graders do not like silly things, even creative silly things"; "some chapters

weren't enough of a challenge."

There was some variability in the teaching strategy which teachers used in implementing the program. One teacher used an individualized approach in which students read the narratives and worked independently or in small groups with teacher guidance. Another teacher read the narratives to the students and then grouped students to work at their own rate. The third teacher used an approach that was not as individualized as the first teacher's but less whole-class oriented than that of the second teacher. The teachers indicated that they would use the program again although perhaps not in the same way they had in the pilot test. The changes they would make involved making the teaching strategy rely less on the independence of the students, spacing the exercises throughout the school year, and using the booklet with students having a broader range of abilities.

That the teachers seem generally satisfied with the workbooks in their present form is an apparent contradiction with the more negative finding related to the usability of the exercises for students. Responses on the teacher questionnaire suggest that teachers may have been accepting of modest pupil performance on the exercises.

In summary, while teachers seem to be able to adapt the workbook to their particular situation, reworking of the exercises is required to yield better results in the student's performance on the workbook exercises. Attention should also be given to providing material for boys, for older children, and for a broader range of student ability.

III
Attainment of Product Objectives

While the first field trial of a product necessarily focuses upon detection of specific problems which can be corrected, data regarding the attainment of product objectives are also of interest. The objectives for Saturday Subway Ride stated in Chapter I are repeated here.

Primary Objectives

1. Pupils will demonstrate their understanding of the five techniques of creative problem solving presented in the text through completion of pertinent workbook exercises.

2. The attitude of pupils toward creative ideas and endeavors will improve.

Secondary Objectives

3. The verbal fluency of pupils will increase.

4. The writing of pupils will be more imaginative.

It may be noted that the last three objectives are stated relatively rather than in terms of a behavioral criterion. In the area of creativity absolute standards of performance are difficult to establish. Thus, the objectives related to attitudes, verbal fluency, and writing call for improvement in performance as indicated by a statistically significant change in the positive direction. Measuring the attainment of these objectives obviously requires both pre- and post-testing.

Instrumentation

The ratings for those exercises dealing with the five problem-solving techniques constitute the data for the first objective. The relevant exercises in 58 workbooks were rated on a five-point scale and the data for each exercise summarized by sex and school.

Objective 2 was assessed by an attitude questionnaire (see Appendix E). The questionnaire is a 22-item instrument in which students respond by checking "agree," "not sure," or "disagree" to items such as "Trying new things makes me shy or uncomfortable." The survey is intended to measure the student's attitude toward: (1) his own ability to think of new ideas, (2) the value of creative imagination, and (3) creative writing. In scoring the instrument, weights were initially assigned to each response, with a weight of "4" given to the most desirable response (which could be "agree" or "disagree" depending on the wording of the item), "3" to the "not sure" response, and a weight of "2" to the remaining response. No response was weighted "1." The reciprocal averages procedure (Torgerson, 1958) was applied to refine the weighting scheme, and a modified set of weights used to score both pretest and post-test. The maximum possible score was 82.

Objective 3 was assessed by three tests adapted from the Christensen-Guilford battery (1957, 1958) to assess associational, ideational, and word fluency (see Appendix F). Scoring was based on the total number of unrepeated responses that fit in a category, such as "modes of transportation."

Objective 4 was assessed by short samples of a student's skill in handling prose writing in which the stimulus for the writing was a picture (see Appendix G). The pupil's score was the average of the ratings given by three Center personnel trained to rate writing. Pre- and post-session writing samples were combined and then all were arranged in a random order. Each of the three raters read the samples in a different random order. The readers read

each sample rapidly for a total impression rather than making an analytical judgment (Godshalk, Swineford, & Coffman, 1966). A score of "5" was given to a superior sample, "4" to an above average sample, "3" to an average sample, "2" to a below average sample, and "1" to an inferior sample. Scoring followed sessions in which raters worked together evaluating fourth-grade writing samples to establish a common standard for the ratings.

Finally, the instrumentation for the field test of a creativity program seemed incomplete without the inclusion of the widely-known Torrance Tests of Creative Thinking (Torrance, 1966). The "Unusual Uses" subtest (see Appendix H) dealing with generating new and unusual uses for either tin cans or cardboard boxes was selected as being most related to the program content. Scores for fluency (number of ideas), flexibility (number of categories of ideas), and originality (uniqueness of ideas) of the responses were computed according to instructions in the Directions Manual and Scoring Guide.

Two forms of all tests were available.

Data Collection and Analysis

Each student responded to workbook exercises during program implementation. Teachers scheduled the use of all exercises, but individual pupils may have been absent when some were attempted. Additionally, pupils were pre- and post-tested on the instruments related to objectives on attitude, verbal fluency, imaginative writing, and on the Torrance subtest. Tests were administered in October, 1970, and in January, 1971. While both pre- and post-test scores were entered in the analysis, the difference or change score was the criterion for program effect. Because the equivalence of the two forms of the various instruments was not established, the order in which the two available forms were used differed in the two schools. Students in one school received Form A in October and Form B in January, while for the other school the order was reversed.

Scores of individual pupils were the unit of analysis. While it would have been preferable to utilize the classroom as the unit, thereby recognizing the common predispositions and experiences of pupils within the classroom, the fact that there were only two such units involved in the pilot weighed against adopting this procedure.

Analyses of variance and covariance were performed to study change over time, which is presumed to have been produced by the program, and the relation of that change to baseline levels of performance and to sex. The "change" factor to be reported is based on the within-subject comparison of post-test to pre-test scores. Form is also a within-subject comparison as it is based on the difference in a subject's scores on the forms labeled A and B for each variable. In addition, although these are not of main interest, the effects of sex and school/grade in overall level of performance were also analyzed.

As previously described, forms A and B were presented in different order in each school. The result is that among the three factors of change over time, form, and school/grade, each main effect is confounded with the interaction of the other two factors. Thus, the analysis of the amount of change, which is confounded with any form by school interaction effect, assumes that any school differences are equally reflected on both forms. Also, because of the confounding no direct inferences concerning change by form or change by school/grade interactions are possible. Nevertheless, the simple design was adopted because the primary concerns in the tryout were (1) to obtain information to modify the product and (2) to get a gross indication of whether product objectives, including changes in performance on some tests, were attained.

Results

Objective 1. Pupils will demonstrate their understanding of the five techniques of creative problem solving presented in the text through completion of pertinent workbook exercises.

The relative frequency of ratings for the workbook exercises dealing with the five problem-solving techniques were presented in Table 1 (see p. 6). The relative frequency of successful performance is presented by school and sex in Figure 1. Inspection of Table 1 indicates that except for a portion of the PART-CHANGING exercise fewer than two-thirds of the pupils were able to demonstrate their ability to apply the techniques as indicated by a rating of 3 or 4. The CHECKERBOARD method was learned by almost two-thirds of the pupils while slightly more than one-half of the students received acceptable ratings for BRAINSTORMING. Less than one-half of the pupils responded acceptably to the CHECKLIST method and the FIND-SOMETHING-SIMILAR method. Thus, it may safely be said that the primary objective of the program related to learning the five problem-solving techniques was not attained by a majority of the pupils.

Inspection of the relative frequency of satis-

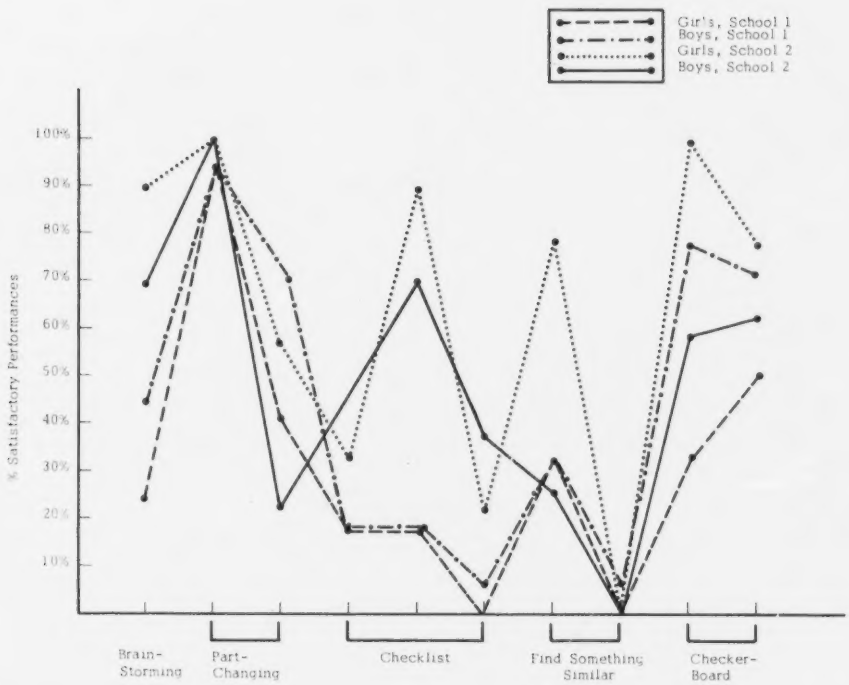


Fig. 1. Relative frequency of successful performance by school and sex.

factory ratings by school and sex suggests that performance on the BRAINSTORMING and CHECKLIST exercises differed between schools with School 2, or sixth graders, being more successful. Factors which might account for these differences are not known. The data also reflect the relatively greater success of boys than girls with the exercises.

Objective 2. The attitude of pupils toward creative ideas and endeavors will improve.

The data contained in Table 2 support rejection of the null hypothesis related to a student's change in his attitude toward the use of creative imagination. The change in pupil attitude, in other words, is significant, and it is positive. Mean pre-test score of a possible 82 points was 63.43, and mean post-test score was 66.21, a gain of 2.78. The standard error of the gain adjusted for covariance with 86 degrees of freedom is .7403. This yields a 95% confidence interval of 1.30 to 4.24 for the observed gain. Data support the conclusion that post-test scores are influenced by pre-test scores and hence covariance adjustment is required. Other factors were not significant. Table 3 contains the gains in students' attitude under the conditions of School/Grade and Sex.

Objective 3. The verbal fluency of pupils will increase.

Verbal fluency of three kinds was tested on open-ended tasks where the number of responses made by a pupil yielded his score. The analysis of these data leads to rejection of the null hypothesis related to change in a student's level of verbal fluency. As shown in Table 4 in the row entry titled "Change," there is a significant change when the three variables are considered collectively in the multivariate analysis. When taken singly, there is a significant change for associational and ideational fluency, but not for word fluency.

While gains were observed for all three tests, it is apparent that the most substantial gain was observed for associational fluency. In Table 5 the means for both pre- and post-test on each variable are presented with the gain and confidence interval for the gain. The row entry dealing with Change by Initial Verbal Fluency (Table 4) contains data indicating the dependency of post-test scores on pre-test scores. The use of covariance adjustment in calculating gain scores is warranted by the significant outcome in this line.

The average amount of gain on the tests was significantly different for the two schools

Table 2
Analysis of Covariance of Attitude Toward Creative Imagination

Source	df	MS	F	p
Within Subjects				
Change	1	196.99	4.71	.0499
Change by Initial Attitude (covariate)	1	1202.65	28.73	.0001
Change by Sex	1	23.74	.57	.45
Form or School by Change	1	30.61	.73	.39
Form by Sex	1	.05	.00	.97
Change by Subjects within Cells, Residual	86	41.86		
Between Subjects				
Mean	1			
Sex	1	330.00	1.94	.17
School	1	392.28	2.31	.13
School by Sex	1	116.49	.69	.41
Between Subjects within Cells	87	169.95		

Table 3
Adjusted Mean Attitude Changes by School/Grade and Sex

	Boys	Girls	Average
School 1	1.52	2.77	2.15
School 2	2.82	3.98	3.40
Average	2.17	3.38	2.78

and was significantly different for boys and girls. From Table 6 in which change scores are presented for the three types of fluency scores, it is apparent that girls perform fairly consistently better than boys in both schools. Inspection of the mean gains also indicates that School 2 consistently outgained School 1. While school and form order are confounded, the consistently better performance of School 2 across the three measures suggests that school, and not form, may account for the differences in change observed. The strong school effect was observed despite the fact that initial level of performance was higher for School 2 than for School 1.

Objective 4. The writing of pupils will be more imaginative.

Data for Objective 4 are based on ratings

Table 4
Multivariate Analysis of Covariance of Verbal Fluency Change

Source[a]	df	Significance Level: Multivariate Test	Univariate Tests[b]: Assoc.	Idea.	Word
Within Subjects					
Change	1	.0001	.0001	.0001	.53
Change by Initial Verbal Fluency (covariate)	3	.0001	.008	.0001	.0001
Change by Sex	1	.06			
Form and/or Change by School	1	.0009	.001	.0003	.96
Sex by Form	1	.31			
Change by Subjects for Error	84				
Between Subjects					
Mean	1				
Sex	1	.026	.09	.04	.004
School/Grade	1	.0001	.0001	.0001	.0001
Sex by School/Grade	1	.31			
Between Subjects Residual for Error	87				
Total Subjects	91				

[a] In each case the hypothesis sums of product matrices for multivariate tests or hypothesis sum of squares for univariate tests attributed to a source are unbiased by other sources, i.e., in all cases the "effect" is "eliminated" from the model after all others, except for those assumed to be zero by the design.

[b] If the multivariate hypothesis is rejected the three univariate hypotheses are tested as logically separate.

Table 5
Summary of Means and Gain Scores for Verbal Fluency Tests

Variable	Data: Test Means: Pre-Test	Post-Test	Mean Gain	Standard Error[a]	Confidence Interval[b]
Associational Fluency	7.36	13.73	6.37	0.5367	5.30 to 7.44
Ideational Fluency	15.09	18.57	3.48	0.5599	2.37 to 4.59
Word Fluency	30.32	31.01	0.69	1.1029	-1.50 to 2.88

[a] Adjusted by covariance, df for error = 84.

[b] 95% confidence interval per variable.

Table 6
Verbal Fluency Adjusted Mean Gain Scores by Sex and School

Variable/School	Sex		
	Boys	Girls	Average
Associational Fluency			
School 1	3.11	5.48	4.29
2	8.12	8.78	8.45
Average	5.61	7.13	6.37
Ideational Fluency			
School 1	1.78	1.10	1.44
2	4.91	6.14	5.52
Average	3.34	3.62	3.48
Word Fluency			
School 1	-2.36	3.33	0.48
2	-0.57	2.37	0.90
Average	-1.47	2.85	0.69

of pupils' writing on a five-point scale. The analysis of variance summarized in Table 7 suggests that the null hypothesis related to a student's change in his writing ability must be rejected. According to Table 7 predictable relationships between change and both initial writing ability and sex were found in the data. The gains for girls were greater than those for boys as indicated by the mean gain in ratings in Table 8. Noteworthy is the trivial, though positive, change in ratings assigned to boys. The "between subjects" analysis suggests differences in overall level of performance (not gains) between schools. Again, pupils in School 2 were on the average performing better than those in School 1 on both testing occasions. Also, in addition to making larger gains than boys, girls performed at an overall higher level for both pre-test and post-test.

Data relative to the differences among raters of writing ability are contained in Table 9. There is evidence of rater differences particularly in an overall sense but also with regard to the school/grade and form factors. Essentially, this analysis indicates that the reliability of the rating is low, and the standard error of measurement is therefore relatively high, making the statistical test less sensitive. Nonetheless, systematic differences were revealed in the analysis of change scores, as indicated above.

Exploratory analysis on data from Torrance's "Unusual Uses" test. While no expectation for change in performance on the Torrance tests was set by the developer, implicit in the collection of data is the possible detection of a positive change. The null hypothesis was thus tested in the same fashion used for the questions related to the program objectives. The analysis is based on three scores—fluency, flexibility, and originality—obtained from the single instrument.

The analysis of variance summarized in Table 10 indicates that the null hypothesis related to change in a student's creative imagination must be rejected. The evidence indicates that when the three variables are considered collectively there is significant change. Considering them individually,only the originality mean gain score is significantly changed. The adjusted pre-test and post-test means as well as mean changes and confidence intervals for the changes are in Table 11. It may be observed that all changes were negative. As was the case in the previous analyses, the post-test scores were influenced by the pre-test scores. Data to support this

Table 7
Analysis of Covariance of Writing Performance

Source	df	MS	F	p
Change	1	9.79	9.95	.0023
Change by Initial Writing Ability (covariate)	1	25.51	26.03	.0001
Change by Sex	1	6.15	6.23	.01
Form and/or Change by Level	1	.00+	0.00+	.96
Form by Sex	1	1.08	1.10	.30
Change by Subjects	82	0.98		
Between Subjects				
Sex	1	10.98	18.60	.001
School/Grade	1	12.05	20.42	.0001
Sex by School/Grade	1	0.26	0.44	.51
Between Subjects within Cells	83			

Table 8
Writing Ability Adjusted Mean Change in Ratings by School/Grade and Sex

	Boys	Girls	Average
School 1	0.21	0.48	0.35
School 2	-0.01	0.74	0.37
Average	0.10	0.61	0.36

Table 9
Multivariate Analysis of Rater Differences among Three Raters

Source	df*	Significance Level
Between Raters	1	.0002
Between Raters by School/Grade	1	.04
Between Raters by Sex	1	.85
Between Raters by School/Grade by Sex	1	.42
Between Raters by Time	1	.36
Between Raters by Time by Sex	1	.55
Between Raters by Form	1	.03
Between Raters by Form by Sex	1	.35

*dfs are for between subject sources.

Table 10
Multivariate Analysis of Covariance of Creative Imagination

Source[a]	df	Significance Levels			
		Multivariate Test	Univariate Tests[b]		
			Fluency	Flexibility	Originality
Within Subjects					
Change	1	.007	.63	.18	.001
Change by Initial Creative Imagination	3	.0001	.0001	.0001	.0001
Change by Sex	1	.44			
Form and/or Change by School	1	.0001	.23	.30	.002
Sex by Form	1	.22			
Change by Subjects	84				
Between Subjects					
Sex	1	.29			
School/Grade	1	.003	.06	.001	.08
Sex by School/Grade	1	.49			
Within Cells	84				

[a] In each case the hypothesis sums of product matrices for multivariate tests or the hypothesis sum of squares for univariate tests attributed to a source are unbiased by other sources, i.e., in all cases the "effect" is "eliminated" from the model after all other effects, except for those assumed to be zero by the design.

[b] If the multivariate hypothesis is rejected the three univariate hypotheses are tested as logically separate.

Table 11
Summary of Changes in Creative Imagination and Related Data

Variable	Data				
	Adjusted Means		Mean Change	Standard Error[a]	Confidence Interval[b]
	Pre-Test	Post-Test			
Fluency	19.44	18.99	-0.45	0.94	-2.33 to +1.43
Flexibility	9.67	9.24	-0.43	0.32	-1.07 to +0.21
Originality	9.01	7.49	-1.52	0.46	-2.44 to -0.60

[a] Adjusted for covariates, df = 80.

[b] 95% confidence interval per variable.

Table 12
Creative Imagination Adjusted Mean Gain Scores by
Variables School/Grade and Sex

Variable/School	Sex		Change
	Boys	Girls	
Fluency			
School 1	-7.93	-2.00	-4.96
School 2	5.43	2.68	4.05
Average	-1.25	.35	-.45
Flexibility			
School 1	-.78	-.56	-.67
School 2	.03	-.41	-.19
Average	-.38	-.48	-.44
Originality			
School 1	3.36	5.50	4.42
School 2	-8.91	-6.50	-7.43
Average	-2.54	-.50	-1.52

claim are in the row entry that indicates changes by initial score levels (Table 10). The remainder of Table 10 contains data related to the influence of other factors. While sex was not related to overall level of performance, the school/grade and form variables were. That the directions of change are different for the two schools with respect to fluency and originality, suggested by the significance of the school/grade factor in the between subjects analysis, is borne out by mean changes for various cells in Table 12. This outcome might be due to real form differences but with the confounding of form order and school/grade, a definitive judgment cannot be made. In summary, there is some evidence that the effect of the instructional program on creative imagination as defined by Torrance and reflected in the "Unusual Uses" test is negative, but the data are inconsistent in some respects and uninterpretable in others.

IV
Conclusions and Discussion

The data reported in the preceding two chapters yield mixed results. Ironically, it is in the area of the global measures for the secondary objectives that the program is most clearly supported. It is usually the case that the primary objectives for the program segments are most clearly achieved and one must hedge about the other measures. However, a majority of the pupils did not learn two of the creative problem-solving techniques, and many other exercises were unsuccessfully attempted as well. Clearly the creativity program needs reworking if it is to be used successfully in the classroom and if the pupils are to learn the five techniques.

Information in the field test manager's report suggests that there are problems both in conceptualization of the exercises and in the procedural matters related to the exercises. The relationship between the problem-solving techniques and the exercises needs examination and enough information and practice provided so that the pupils can attain the program objective. Also, the directions for some exercises should be reworked so that more students will attempt them. Subject matter for the exercises should be selected to appeal more to boys. Inasmuch as at least half of the exercises require improvement, however, a revised program would be quite different from the one that was effective in producing positive changes in attitude, fluency, and creative writing. One can only surmise (or re-evaluate) whether the revised program will be as effective.

The creativity program is a qualified success in achieving other product objectives. Significant positive changes were observed for attitude toward creativity for verbal fluency and for creative writing, but only for attitude was the amount of change unrelated to sex or the school/grade variable. The verbal fluency gains were much greater in one school than the other, and girls improved in creative writing whereas boys showed little change. Although writing ability was the only variable to be influenced by the sex factor, perhaps the inclusion of a broader range of subject matter, as suggested by the professionals working with the program, would strengthen the workbook.

Data related to improved use of creative imagination suggest that the program may have a deleterious effect. The purpose of including the Torrance instrument was merely to explore a possible program "spin-off." Inasmuch as there was no pretense on the part of the developer to change creative behavior as conceived by Torrance and reflected in his tests, and because the data are inconsistent and difficult to interpret, this negative finding is not crucial.

The data reveal consistently, except in the attitude measure, that mean levels of performance were different in the two schools, and gains generally were greater with initial higher performance. This information, however, must be interpreted with the knowledge that the better performing pupils were approximately one year older than were the other pupils. The differences in implementation in the three classrooms further confound any interpretation of relative effectiveness of the program when used under various circumstances. Indeed, there seems to be an ample supply of questions that call for evaluation of the refined product in a larger number of classrooms. The evaluation reported herein should therefore be regarded as a small but meaningful step in assessing the quality and suggesting improvements for a product still under development.

References

Allen, M. S. Morphological creativity. Englewood Cliffs, N. J.: Prentice-Hall, 1962.

Christensen, P. R., & Guilford, J. P. Christensen-Guilford fluency tests. Beverly Hills, Calif.: Sheridan Supply Co., 1957 (Associational, Ideational Fluency), 1958 (Word Fluency).

Crawford, R. P. The techniques of creative thinking. New York: Hawthorn, 1954.

Dale, E., & Chall, J. A formula for predicting readability: Instructions. Educational Research Bulletin, 1948, 27, 37-54.

Davis, G. A. Training creativity in adolescence: A discussion of strategy. Journal of Creative Behavior, 1969, 3, 95-104.

Davis, G. A., & Houtman, S. E. Thinking creatively: A guide to training imagination. Wisconsin Research & Development Center for Cognitive Learning, 1968.

Davis, G. A., Houtman, S. E., Warren, T. F., & Roweton, W. E. A program for training creative thinking: I. Preliminary field test. Wisconsin Research & Development Center for Cognitive Learning, Technical Report No. 104, 1969.

Davis, G. A., Manske, M. E., & Train, A. J. Training creative thinking. Wisconsin Research & Development Center for Cognitive Learning, Occasional Paper No. 6, 1967.

Edwards, M. O. A survey of problem solving courses. Journal of Creative Behavior, 1968, 2, 33-51.

Godshalk, F. I., Swineford, F., & Coffman, W. E. The measurement of writing ability. New York: New York College Entrance Examination Board, 1966.

Klausmeier, H. J., & Ripple, R. E. Learning and human abilities. New York: Harper & Row, 1971. P. 518.

Myers, R. E., & Torrance, E. P. Invitations to thinking and doing. Boston: Ginn, 1964.

Myers, R. E., & Torrance, E. P. Can you imagine? Boston: Ginn, 1965. (a)

Myers, R. E., & Torrance, E. P. Invitations to speaking and writing creatively. Boston: Ginn, 1965. (b)

Myers, R. E., & Torrance, E. P. For those who wonder. Boston: Ginn, 1966. (a)

Myers, R. E., & Torrance, E. P. Plots, puzzles and ploys. Boston: Ginn, 1966. (b)

Myers, R. E., & Torrance, E. P. Stretch. Minneapolis: Perceptive, 1968.

Olton, R. M., & Crutchfield, R. S. Developing the skills of productive thinking. In P. Mussen, J. Langer, & M. V. Covington (Eds.), New directions in developmental psychology. New York: Holt, Rinehart, & Winston, 1969.

Osborn, A. F. Applied imagination. New York: Scribner's, 1963.

Parnes, S. J. Can creativity be increased? In S. J. Parnes & H. F. Harding (Eds.), A source book for creative thinking. New York: Scribner's, 1962. Pp. 185-191.

Parnes, S. J. Workbook for creative problem solving institutes and courses. Buffalo, N. Y.: Creative Education Foundation, 1966.

Torgerson, W. S. Theory and methods of scaling. New York: Wiley, 1958.

Torrance, E. P. Torrance tests of creative thinking. Princeton, N. J.: Personnel Press, Inc., 1966. Pp. 10-11.

Appendix A
Behavioral Objectives for the Workbook Exercises

Exercise 1—Songs and Song Writing

1. The student writes words to a favorite song.
2. The student expresses in writing the feeling the song gives him.
3. The student writes a song having the same rhythm and mood as the favorite song.

Exercise 2—Illustration

1. The student describes an imaginary "It" using any media he chooses.

Exercise 3—Dialogue

1. The student writes a dialogue, several dialogues, or a scene.

Exercise 4—Dialogue - A Scene for Study or Discussion

1. The student writes an exit scene with action, sounds and dialogue to get himself to Pittsburgh.

Exercise 5—Creating a New Language

1. The student creates an original language and writes something using the language.

Exercise 6—Brainstorming

1. The student produces a quantity of ideas in a brainstorming group.
2. The student identifies his best ideas.

Exercise 7—The Part-Changing Method of Creative Problem Solving

1. The student lists ideas for categories labelled "qualities" (parts 1 and 2).
2. The student lists qualities and ideas for those qualities (parts 3 and 4).

Exercise 8—Advertising Campaign

1. The student chooses a product to advertise.
2. The student identifies qualities of the product and the audience it is intended for.
3. The student writes a TV commercial, a radio commercial, a magazine ad, and a billboard and designs the product package.

Exercise 9—The Checklist Method of Creative Problem Solving

1. The student identifies checklists to provide ideas for a family summer vacation and for

Christmas presents.
2. The student identifies play themes by using his history book as a checklist.

Exercise 10—Tall Tales

1. The student chooses one topic from several offered and writes a tall tale about it.

Exercise 11—Discussion of Differences

1. The student describes himself using any media he chooses.
2. The student describes in writing a day in the life of an imaginary person different from himself.

Exercise 12—The Find-Something-Similar Method of Creative Problem Solving

1. The student finds ideas to solve a school parking problem by thinking of how animals store things and then chooses his best ideas.
2. The student identifies ways to transport a baby brother by thinking of how people in other countries (or in history) transport things.
3. The student states specific problems in a general way.

Exercise 13—Describing People

1. The student chooses a few magazine pictures of various people and builds stories around the pictures.

Exercise 14—Discussion

1. The student discusses some questions about war.

Exercise 15—Plot and Action

1. The student completes two unfinished episodes.

Exercise 16—Role Playing

1. The student writes a description of an argument from the point of view of the person with whom he was arguing.

Exercise 17—The Checkerboard Method of Creative Problem Solving

1. The student lists new scents for and new ways to package perfume.
2. The student creates a new game by listing pieces of equipment and things the players do.

Exercise 18—Story Ending

1. The student writes an ending for a pirate fantasy described in the narrative.

Appendix B
Ratings of Exercises by Grade and Sex

	Ratings by Percent											
	0				1 or 2				3 or 4			
	5th Grade		6th Grade		5th Grade		6th Grade		5th Grade		6th Grade	
Exercise	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
1	0.0	0.0	0.0	0.0	75.0	15.8	61.1	22.2	25.0	84.2	38.9	77.8
2	0.0	5.3	0.0	0.0	25.0	63.2	22.2	33.3	75.0	31.6	77.8	66.7
3	8.3	0.0	5.6	0.0	33.3	21.1	16.7	11.1	58.3	78.9	77.8	88.9
4	16.7	31.6	5.6	33.3	58.3	68.4	61.1	55.6	25.0	0.0	33.3	11.1
5	41.7	15.8	5.6	11.1	41.7	63.2	38.9	44.4	16.7	21.1	55.6	44.4
6	58.3	21.1	44.4	0.0	16.7	10.5	11.1	11.1	25.0	68.4	44.4	88.9
7 (1 & 2)	0.0	0.0	5.6	0.0	8.3	0.0	0.0	0.0	91.7	100.0	94.4	100.0
(3 & 4)	0.0	5.3	5.6	11.1	58.3	63.2	22.2	33.3	41.7	31.6	72.2	55.6
8	16.7	5.3	5.6	0.0	33.3	36.8	33.3	11.1	50.0	57.9	61.1	88.9
9 (1)	8.3	5.3	16.7	0.0	75.0	47.4	66.7	66.7	16.7	47.4	16.7	33.3
(2)	41.7	5.3	33.3	0.0	41.7	26.3	50.0	11.1	16.7	68.4	16.7	88.9
(3)	25.0	0.0	11.1	0.0	75.0	63.2	83.3	77.8	0.0	36.8	5.6	22.2
10	0.0	5.3	11.1	0.0	50.0	52.6	27.8	44.4	50.0	42.1	61.1	55.6
11	8.3	10.5	11.1	22.2	33.3	63.2	50.0	44.4	58.3	26.3	38.9	33.3
12 (1 & 2)	0.0	10.5	0.0	0.0	66.7	63.2	66.7	22.2	33.3	26.3	33.3	77.8
(3)	8.3	15.8	0.0	0.0	91.7	84.2	94.4	100.0	0.0	0.0	5.6	0.0
13	41.7	21.1	27.8	11.1	25.0	47.4	27.8	11.1	33.3	31.6	44.4	77.8
14	25.0	15.8	16.7	44.4	66.7	26.3	44.4	0.0	8.3	57.9	38.9	55.6
15	8.3	15.8	5.6	11.1	58.3	47.4	44.4	33.3	33.3	36.8	50.0	55.6
16	0.0	0.0	0.0	22.2	83.3	78.9	66.7	55.6	16.7	21.1	33.3	22.2
17 (1)	0.0	15.8	0.0	0.0	66.7	26.3	22.2	0.0	33.3	57.9	77.8	100.0
(2)	0.0	0.0	5.6	0.0	50.0	36.8	22.2	22.2	50.0	63.2	72.2	77.8
18	0.0	5.3	0.0	0.0	75.0	21.1	22.2	22.2	25.0	73.7	77.8	77.8

Appendix C
Field Test Manager's Report

The comments to follow are subjective impressions gained through reading the student workbooks, talking with the teachers and students who use the material, observing the exercises being used, and studying and critiquing the workbook with the intent of writing an accompanying teacher's guide. The exercises in the workbook deal with both writing (descriptive and subjective) and idea production, using five creative problem-solving techniques. In both cases, the workbook fails to provide the student with the skills and insights he needs to do the exercises. No specific writing skills are taught either through the narrative or in the exercise introductions, so the student is left without direction. Explanations of the five idea-producing techniques are either lacking or brief and inadequate. The following observations deal with each exercise specifically.

Exercise 1—Songs and Song Writing

Many students couldn't remember the lyrics of a song, or else they tended to choose a simple one, like "Row Your Boat," which provided for neither depth of feeling nor much thought on the part of the student. Furthermore, as one teacher pointed out, the narrative has just introduced the student to the idea of "letting your mind go," and then the first exercise asks him to reproduce a song from memory.

Exercise 2—Illustration

In a large number of cases, students described the "It" that was created in the narrative. Thus, the exercise did not reflect their own imaginations. However, in some instances, students at least chose a medium other than writing through which to reproduce the story "It."

Exercise 3—Dialogue

The characters in two dialogues, a hairy beast and a handsome prince, and two astronauts, stimulated dialogue that was often stereotyped and silly. A scene with a boy presenting his idea to stop air pollution to the President was too limiting. The student's statement for the boy was "I have a great idea," instead of the creative solution itself. Several students didn't do the scene in which they could create their own characters, situation, and dialogue. From the point of view of teaching the skill of writing dialogue, space for one exchange of comments does not allow for the development of a conversation or situation.

Exercise 4—Dialogue - A Scene for Study or Discussion

The directions to write an exit scene to get you from "here" to Pittsburgh were unclear to some of the students. An exit from the classroom ("here") seemed unexciting, so many of the students resorted to the exciting episodes that had been happening to the narrator but which were not the students' creations. This exercise needs to have additional writing space provided.

Exercise 5—Creating a New Language

This exercise seemed to appeal more to boys than girls. Several students made up codes of entire alphabets and, as indicated by one teacher, students continued to use those codes in passing class notes (6th graders especially). Perhaps the concept of creating a systematic language was too overwhelming or sophisticated for some students, who simply created a few new nouns.

Exercise 6—Brainstorming

During classroom visitations, some students indicated that they had not been grouped for this activity but had worked individually instead. They felt that a list of topics from which to choose for brainstorming would have been helpful. Procedures for brainstorming are not explained prior to the exercise. They are perhaps only inferred in the narrative.

Exercise 7—The Part-Changing Method of Creative Problem Solving

Many students had difficulty with the last two parts of the exercise (questions 3 and 4). In some cases students didn't differentiate between "qualities" and "ideas for each quality category." Question 4, in which qualities of various items are identified, should precede question 3, which asks for qualities and ideas.

Exercise 8—Advertising Campaign

This exercise could offer the opportunity for students to practice brainstorming as a means for thinking of ideas for new products and different ways to promote those products. Advertising was fairly popular and some products were quite creative. Several students thought that too many advertising techniques (e.g. billboard, TV ad, etc.) were required. They would rather have spent time on thinking of a unique product and one good "sales pitch" for it.

Exercise 9—The Checklist Method of Creative Problem Solving

Many students missed the point in this exercise. The exercise explanation combines concepts from the find-something-similar method (imagining oneself in different situations) and brainstorming (the technique of "idea hitchhiking") which combination seems to complicate the checklist technique. Most students listed specific ideas rather than checklists that would serve as frameworks or general references from which to obtain ideas.

Exercise 10—Tall Tales

The exercise provides no introductory explanation of what a tall tale is. Several students wrote a one-or two-sentence answer for each of the five suggested topics rather than developing any one of them in detail. The example provided in the narrative itself was both brief and simplistic.

Exercise 11—Discussion of Differences

This exercise seemed to appeal more to the girls in general. Most of the letters describing the students dealt with physical characteristics rather than with likes, dislikes, and ideas. Very few students created an imaginary respondent to the letter. Thus, the purpose of the exercise—to sensitize students to their own feelings and how these might be similar or different from the feelings of others—was missed.

Exercise 12—The Find-Something-Similar Method of Creative Problem Solving

The first part of the exercise—thinking of ideas to solve a packing problem—didn't seem relevant to the students. Perhaps a situation they deal with more directly in their experiences would elicit more and better ideas. For the most part, students almost unanimously missed the point of stating a specific problem in more general terms (question No. 3), a skill that is important for opening the problem to a larger variety of solutions.

Exercise 13—Describing People

The responses to this exercise were not very creative. As with Exercise 11, the students described physical characteristics of the people in the magazine pictures but did not imagine the thoughts or feelings of those people nor did they write a story based on the picture. The introduction of skills such as careful description, choosing the exact word, and elaboration would be helpful to the student at this point.

Exercise 14—Discussion

Several students indicated that they had answered the questions on their own rather than having a group discussion on war. The answers reflected very little thought or depth of feeling. References to various early wars (e.g. Hannibal) were foreign to some students—particularly at these less advanced grade levels.

Exercise 15—Plot and Action

The narrative provided no example nor preparation for continuing a plot episode to a logical conclusion. Both exercises presented to the student deal again with war, and, perhaps due to recent changes in elementary social studies curriculum, many students were not familiar with the Maine nor with the term "Tory." Both episodes are very similar in that they're structured, deal with war, and imply a pending death unless some new action is introduced. Perhaps a variety of situations would reach the interests of more students.

Exercise 16—Role Playing

Responses to this exercise were quite poor. The act of getting into another person's shoes builds sensitivity and perceptiveness, but students need help in learning this skill. Most students described their own feelings rather than those of the other participant in the argument. The feelings described were in many instances ones of general anger or resentment and not confined to a specific situation. Perhaps the exercise should provide the option of acting out the situation (actually role playing) rather than writing a description of the dialogue that took place.

Exercise 17—The Checkerboard Method of Creative Problem Solving

This exercise doesn't provide instruction for the second aspect of the checkerboard method - combination. After all ideas have been listed across and down the first row and column, the student is supposed to fill in all the squares of the checkerboard to get all possible idea combinations. An interesting note is that boys seemed to have more unusual ideas for new perfumes and the girls for new games. Perhaps we come up with more imaginative ideas for something with which we are less familiar. Certainly our minds are less confined or structured by what we know when we're trying to solve something unfamiliar.

Exercise 18—Story Ending

This exercise resulted in some of the best student responses. Students were able to attempt the exercise with little or no extra guidance. In addition there was considerable success in meeting the objective of the exercise. This is a particularly rewarding fact because there had been some boredom experienced in other exercises, but in spite of that the students really got into this last exercise.

Appendix D
Teacher Questionnaire—Saturday Subway Ride

1. In general, did your students enjoy Saturday Subway Ride?

   Two of the teachers responded positively; the third felt that the students enjoyed it to an extent but were bored by the end of the workbook and wanted more structure.

2. Did you find that the workbook appealed more to one sex than the other? (If yes, please specify boys or girls.)

   One teacher responded negatively while the others felt that girls enjoyed the workbook more.

3. Did you find that the workbook appealed more to one ability type of student (high, medium, low) or to all equally?

   One teacher felt there was no tendency one way or the other; another stated that children who ordinarily have a hard time expressing thoughts in writing did not respond very well.

4. How many days per week did you work on Saturday Subway Ride and for how long each day?

   One day for an hour and ten minutes; two days for one hour per day; 1 or 2 days for up to 45 minutes.

5. As well as you can remember, estimate the number of class sessions you spent on each chapter.

1 or 2	Chapter 1	1 or 2	Chapter 5
1 or 2	Chapter 2	1 or 2	Chapter 6
1 or 2	Chapter 3	1 or 2	Chapter 7
1 or 2	Chapter 4		

6. In your opinion, were the vocabulary level or the exercises too difficult for your students in general? (Please specify which exercises or parts of the narrative.)

   The high ability groups appeared to have no trouble. One teacher felt the vocabulary level and exercises were many times too easy.

7. Were any exercises inappropriate in your opinion? (Please specify.)

   One teacher noted that the class didn't enjoy creating the song; the other teachers felt the exercises were generally appropriate.

8. Approximately how much time on the average did you spend in the preparation of a chapter?

   15 minutes to 1/2 hour.

9. Please describe briefly the general procedure you followed with each chapter in class (e.g. teacher presentation to class, teacher read narrative/students read narrative individually and worked on exercises independently, students worked in small groups, etc.)

   Response varied from an emphasis on teacher presentation to an emphasis on independent work with one teacher including some of both. All teachers used the small group mode.

10. Were any chapters "difficult" to handle? (Need more structure? Didn't know how to prepare for the lesson, etc.)

    In exercise 1, one teacher felt there was too much emphasis on remembering the words of a song. Another teacher commented on the lack of structure and challenge in some chapters.

11. What types of "help" would you like to see in a Teacher's Guide? (a rationale explaining the objectives of each exercise? ways of presenting the exercise to the class? ways to extend the exercise? other?)

    A rationale and ways to extend and present the exercises were perceived as necessary.

12. Did you evaluate the children's work? If yes, how?

    One teacher talked to each child individually about his work. Another looked over the books and a third teacher did not evaluate them.

13. (Optional) additional comments of any kind concerning the use of the workbook or the students' reactions to it:

    One teacher felt that creative writing should be interspersed into a curriculum based on grammar and sentence structure in order that the children might be more challenged by the writing projects. Another teacher listed exercises 7, 10, 17, and 18 as ones enjoyed by the children but added that exercise 9 wasn't enjoyed as much.

Appendix E
Attitude Questionnaire

HOW DO YOU FEEL ABOUT IT?

Name: _____ Sex: M_____ F _____

School: _____ Grade: _____

Teacher: _____ Date: _____

Here are some questions to find out how you feel about writing, about new ideas, and about yourself. For each statement inside, there are three possible answers: Agree, Not Sure, and Disagree. If the statement seems right to you, put an X in the blank under the word Agree. If you are not sure or you don't know, put an X in the blank under the words Not Sure. If the statement seems wrong to you, put an X in the blank under the word Disagree.

SAMPLE:

	Agree	Not Sure	Disagree
1. I like to swim.	_____	_____	_____

Be sure your answers are what you think is true for you. There are no "right" or "wrong" answers. How you mark these items will have NOTHING to do with any grades you receive in any class. We really want to know how you honestly feel, so don't be afraid to express yourself. You will have 10 minutes.

Are there any questions?

You may begin when I say "GO."

Attitude Questionnaire A

HOW DO YOU FEEL ABOUT IT?

	Agree	Not Sure	Disagree
1. A person can learn to think of new ideas.	____	____	____
2. Wild or unusual ideas can be very helpful.	____	____	____
3. When I write, I try to think of lots of ideas instead of just one that seems "right."	____	____	____
4. A good sense of humor can be very helpful in writing.	____	____	____
5. I try to look for different ways of doing things.	____	____	____
6. Trying new things makes me feel shy or uncomfortable.	____	____	____
7. I think my ideas are as imaginative as anyone else's.	____	____	____
8. I try to write what I really feel, even if it's different from what everyone else feels.	____	____	____
9. Almost anything we do needs more imagination.	____	____	____
10. You should be sure that what you say is <u>right</u> before you say it.	____	____	____
11. Writers and scientists and engineers need new ideas, but the average person does not.	____	____	____
12. I like to write.	____	____	____
13. Everyone can learn to be more imaginative than he is now.	____	____	____
14. When I have to write about something, I have trouble thinking of ideas.	____	____	____
15. If my ideas are different from my teacher's or my friends' ideas, I change my ideas.	____	____	____
16. People who have lots of new ideas seem more interesting to know.	____	____	____

GPO 827-872-6

17. I feel free to really use my imagination when I write. ____ ____ ____

18. I think writing is boring and hard and I would not do much of it if I weren't in school. ____ ____ ____

19. Ideas that sound silly or wild are just a waste of time. ____ ____ ____

20. I do not tell my ideas because I'm afraid people will laugh at them. ____ ____ ____

21. Being able to say exactly what you think or feel can help you get ahead. ____ ____ ____

22. I have written things without anyone telling me to, just because I enjoy it. ____ ____ ____

Attitude Questionnaire B

HOW DO YOU FEEL ABOUT IT?

	Agree	Not Sure	Disagree
1. Everyone can learn to be more imaginative than he is now.	____	____	____
2. If my ideas are different from my teachers' or my friends' ideas, I change my ideas.	____	____	____
3. Being able to say exactly what you think or feel can help you get ahead.	____	____	____
4. I think my ideas are as imaginative as anyone else's.	____	____	____
5. When I write, I try to think of lots of ideas instead of just one that seems "right."	____	____	____
6. I like to write.	____	____	____
7. People who have lots of new ideas seem more interesting to know.	____	____	____
8. Ideas that sound silly or wild are just a waste of time.	____	____	____
9. Wild or unusual ideas can be very helpful.	____	____	____
10. I feel free to really use my imagination when I write.	____	____	____
11. A good sense of humor can be helpful in writing.	____	____	____
12. I have written things without anyone telling me to, just because I enjoy it.	____	____	____
13. Almost anything we do needs more imagination.	____	____	____
14. A person can learn to think of new ideas.	____	____	____
15. I think writing is boring and hard and I would not do much of it if I weren't in school.	____	____	____
16. Trying new things makes me feel shy or uncomfortable.	____	____	____

17. When I have to write about something, I have trouble thinking of ideas. ____ ____ ____

18. I do not tell my ideas because I'm afraid people will laugh at them. ____ ____ ____

19. Writers and scientists and engineers need new ideas, but the average person does not. ____ ____ ____

20. I try to write what I really feel, even if it's different from what everyone else feels. ____ ____ ____

21. I try to look for different ways of doing things. ____ ____ ____

22. You should be sure that what you say is right before you say it. ____ ____ ____

Appendix F
Fluency Tests

Associational Fluency

Name: _____ Sex: M _____ F _____
Last First

School: _____ Grade: _____

Teacher: _____ Date: _____

In this test you are to write words similar in meaning to the given word.

SAMPLE:

Write words that are similar in meaning to the word Quiet.

silent	soundless
whisper	restful
sleepy	noiseless
soft	

The words written above all are somewhat like the word Quiet in meaning. In the test you are to write as many words as you can that are similar in meaning to the given word.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

Write as rapidly as you can. Do not use the same word more than once. Your score will be the total number of words you write (similar in meaning to the given word).

There are two parts to this test. You will have 2 minutes to work on each part.

Are there any questions?

You may begin when I say "GO."

a. DARK:

b. YELL:

STOP. DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

PART II

a. SICK:

b. SMALL:

STOP. WAIT FOR FURTHER INSTRUCTION.

a. SOFT:

b. CARRY:

STOP. DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

GPO 827-872-5

PART II

a. HEAVY:

b. AFRAID:

STOP. WAIT FOR FURTHER INSTRUCTION.

Ideational Fluency

Name: _____ Sex: M _____ F _____
Last First

School: _____ Grade: _____

Teacher: _____ Date: _____

In this test you are to name things that belong in certain classes.

SAMPLE:

Name liquids you can drink.

milk	beer	
water	lemonade	
tomato juice	Kool-Aid	
soda		

All the liquids listed above are good to drink. There are many other liquids that could have been listed.

The items in this test will be somewhat like the sample item above. Your task will be to write as many things as you can that belong to certain classes. If you are not certain whether a thing fits into the class, write it down anyway and try to think of another suitable thing.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

Write as quickly as you can. Your score will be the number of things that fit correctly into a given category. You will have three minutes.

Are there any questions?

You may begin when I say "GO."

A

Name some types of clothing.

Example: mittens

STOP. WAIT FOR FURTHER INSTRUCTION.

B

Name some types of transportation that can carry you from one place to another.

Example: sailboat

STOP. WAIT FOR FURTHER INSTRUCTION.

46

Word Fluency

Name: _____ Sex: M _____ F _____
Last First

School: _____ Grade: _____

Teacher: _____ Date: _____

In the first part of this test you are to write words that contain a certain letter of the alphabet.

SAMPLE:

Write words containing the letter N.

no	fun	
contain	candy	
net	any	
inning		

All the words written above contain the letter "N" at least once.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

Do not use a word more than once. Do not use different forms of the same word, such as "sand" and "sanding." Your score will be the number of words you write during a short period of time, so work as quickly as you can.

There are two parts to this test. You will have 2 minutes to work Part I.

Are there any questions?

You may begin when I say "GO."

A

PART I

Write words containing the letter I.

STOP. DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

Write words <u>containing</u> the letter <u>A</u>.

STOP. DO NOT TURN THE PAGE UNTIL YOU ARE TOLD TO DO SO.

(Directions for Word Fluency - Part II)

In the second part of this test, you are to write words that begin with a certain letter of the alphabet.

SAMPLE:

Write words that begin with the letter S.

song	sun	
Saturday	so	
sample	snow	
sand		

All the words written above begin with the letter "S."

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

Do not use a word more than once. Do not use different forms of the same word, such as "song" and "songs." Your score will be the number of words you write during a short period of time, so work as quickly as you can. You will have 2 minutes.

Are there any questions?

You may begin when I say "GO."

GPO 827-872-4

PART II A

Write words that begin with the letter C.

STOP. WAIT FOR FURTHER INSTRUCTION.

Write words that begin with the letter T.

STOP. WAIT FOR FURTHER INSTRUCTION.

Appendix G
Writing Sample: WHAT'S IT ALL ABOUT?

53

Writing Sample
A

WHAT'S IT ALL ABOUT?

Name: _____ Sex: M _____ F _____

School: _____ Grade: _____

Teacher: _____ Date: _____

In this test we're going to give you a picture to look at. Underneath the picture, write a short story telling what you think the picture's about.

The picture could be about many things. There is no one "right" answer. So don't be afraid to write down any ideas you think of.

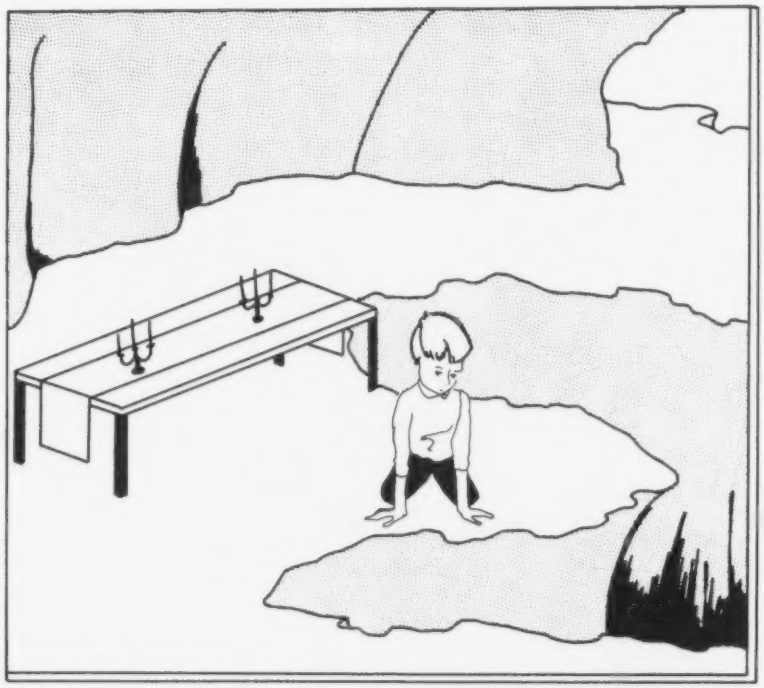
Write as clearly as you can, but do not worry about spelling and punctuation. Just try to make up some good ideas for what's going on in the picture. Then write your ideas in the best way you can on the lines beneath the picture. If you need more space, use the back of the paper.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

You will have 15 minutes to work on this test.

Are there any questions?

You may begin when I say "GO."



Writing Sample
B

WHAT'S IT ALL ABOUT?

Name: _____ Sex: M _____ F _____

School: _____ Grade: _____

Teacher: _____ Date: _____

In this test we're going to give you a picture to look at. Underneath the picture, write a short story telling what you think the picture's about.

The picture could be about many things. There is no one "right" answer. So don't be afraid to write down any ideas you think of.

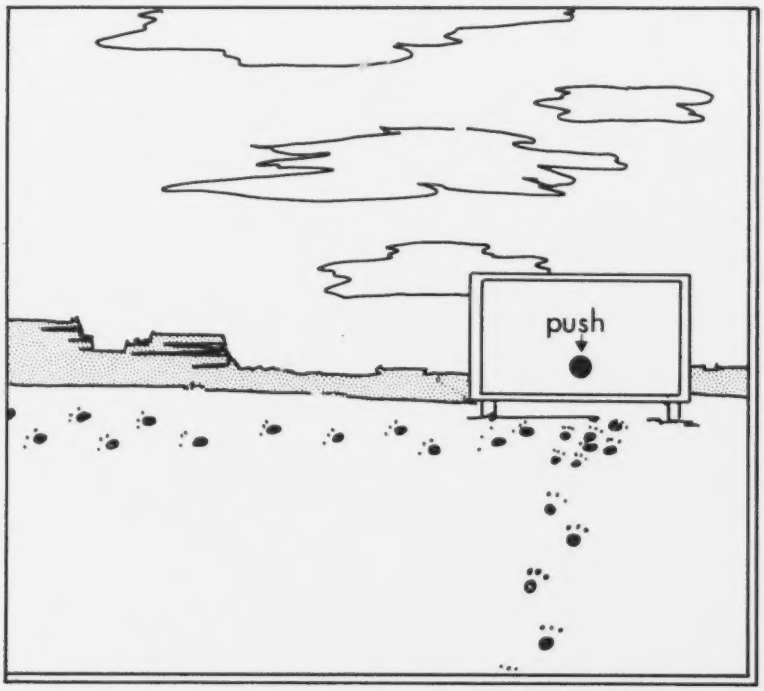
Write as clearly as you can, but do not worry about spelling and punctuation. Just try to make up some good ideas for what's going on in the picture. Then write your ideas in the best way you can on the lines beneath the picture. If you need more space, use the back of the paper.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

You will have 15 minutes to work on this test.

Are there any questions?

You may begin when I say "GO."



GPO 827-872-3

Appendix H
Activity 5: UNUSUAL USES

Activity 5: UNUSUAL USES (Cardboard Boxes)

Most people throw their empty cardboard boxes away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of box. You may use as many boxes as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

33. _____

34. _____

35. _____

36. _____

37. _____

38. _____

39. _____

40. _____

41. _____

42. _____

43. _____

44. _____

45. _____

46. _____

47. _____

48. _____

49. _____

50. _____

Activity 5: UNUSUAL USES (Tin Cans)

Most people throw their tin cans away, but they have thousands of interesting and unusual uses. In the spaces below and on the next page, list as many of these interesting and unusual uses as you can think of. Do not limit yourself to any one size of can. You may use as many cans as you like. Do not limit yourself to the uses you have seen or heard about; think about as many possible new uses as you can.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

33. _____

34. _____

35. _____

36. _____

37. _____

38. _____

39. _____

40. _____

41. _____

42. _____

43. _____

44. _____

45. _____

46. _____

47. _____

48. _____

49. _____

50. _____

GPO 827-672-2

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